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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

MITCHELL, JASON D

ART UNIT	PAPER NUMBER
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2124

DATE MAILED: 11/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/044,731

Applicant(s)

PRAKASH, RAJ

Examiner

Jason Mitchell

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 January 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 January 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

1. This action is in response to an application filed on 1/11/2002.
2. Claims 1-32 are pending in this case.

Drawings

3. Figure 1 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated, as indicated by its inclusion in the Related Art section of the disclosure. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.121(d)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

4. The disclosure is objected to because of the following informalities: On pg. 6, lines 10 'a null pointer check 400' is referenced, the null pointer check in Fig. 3 is has the number 300. Appropriate correction is required.
5. **Claim 26 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim.** Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in

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independent form. Claim 26 recites a fourth, fifth and sixth set of instructions, which duplicate the first, second, and third sets recited in parent claim 25.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. **Claims 2-3, 11-12, 19-20 and 27-28 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.** The claims recite 'passing fault to target translation data from the fault to target translation table to the compiler using a handler program'. There is no disclosure as to what data is being passed, or when and why it is being passed, therefore it is unclear what the cited claims encompass. As a result no prior art rejection will be applied.

8. **Claims 2, 10, 18 and 25-26 recite the limitation "the infrequent condition" in lines 5 (claims 2, 10 and 18) and lines 9 (claims 25 and 26).** There is insufficient antecedent basis for this limitation in the claim. For the purposes of this examination "the infrequent condition" will be taken to represent "the infrequent null pointer condition".

Claim Rejections - 35 USC § 101

9. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

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Claims 25-32 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The claims recite a computer program product to bypass an infrequent null pointer condition, comprising instructions to gather statistics on, determine an acceptable rate of, and insert null pointer conditions into a fault to target translation table. But the claims do not recite, these instructions being embodied in a computer readable medium (i.e. computer readable memory), and thus the invention as claimed does not produce a useful or tangible result. The claims thus recite an abstract idea, without reciting any practical application in the technological arts. Therefore the claims only recite nonstatutory subject matter.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over 'Optimizing Away C++ Exception Handling' by Schilling (Schilling) in view of 'Effective Null Pointer Check Elimination Utilizing Hardware Trap' by Kawahito et al. (Kawahito).

Regarding Claims 1, 9 and 17: Schilling discloses creating a fault to target translation table (pg. 40, col. 1, par. 5 'building ... tables'), relating the fault

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condition to a procedural instruction in the fault to target translation table (pg. 40, col. 1, par. 5 'that relate ranges of instruction counter values to ... exception handling'); and compiling the source program to an executable program (pg. 40, col. 1, par. 5 'at compile and link time').

Schilling does not explicitly disclose the fault table handling null pointer conditions, but instead Schilling discloses handling exceptions in general (pg. 40, col. 1, par. 5 'exception handling').

Kawahito teaches eliminating explicit Null Pointer tests (pg. 139, col. 1, par. 3 'no explicit instruction has to be generated to check the null pointer') through use of the Null Pointer Exception (pg. 139, col. 1, par. 3 'accessing the zero address will throw an exception') in an analogous art for the purpose of optimizing the execution of a program (pg. 139, col. 2, par. 6 'converted to hardware traps ... to minimize the execution cost').

It would have been obvious to a person of ordinary skill in the art at the time of the invention to populate the exception table disclosed in Schilling (pg. 40, col. 1, par. 5 'building ... tables') with the null pointer exceptions disclosed in Kawahito (pg. 139, col. 1, par. 3 'accessing the zero address will throw an exception'), because one of ordinary skill in the art would have been motivated to handle exceptions thrown by null pointer references (pg. 139, col. 2, par. 6 'converted to hardware traps ... to minimize the execution cost') for the purpose of providing program optimization.

Regarding Claims 3, 11 and 19: As indicated in the 112 2nd rejection above, these claims are not being address with prior art. But will be included here in

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order to maintain the dependency chain. Claims 3, 11 and 19 are dependent on claims 1, 9 and 17 respectively.

Regarding Claims 5, 7, 13, 15, 21 and 23: The rejection of claims 1, 3, 9, 11, 17 and 19 are incorporated respectively; further Schilling discloses accessing the fault to target translation table (pg. 40, col. 1, par. 5 'building ... tables') during compiling of the source program (pg. 40, col. 1, par. 5 'at compile and link time').

12. Claims 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22 and 24-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over 'Optimizing Away C++ Exception Handling' by Schilling (Schilling) in view of 'Effective Null Pointer Check Elimination Utilizing Hardware Trap' by Kawahito et al. (Kawahito) as applied to claims 1, 9 and 17 above, and further in view of US 6,189,141 to Benitez et al. (Benitez).

Regarding Claims 2, 10 and 18: The rejections of claims 1, 9 and 17 are incorporated, respectively; further, Schilling and Kawahito do not disclose gathering statistics regarding, and determining an acceptable rate of, occurrences of the infrequent null pointer condition. However Kawahito does disclose his techniques as being applicable to a dynamically compiled language, namely JAVA™ (pg. 139, col. 1, par. 1 'a new algorithm ... written in JAVA™'). Benitez teaches gathering statistics as to the number of times a path is executed and determining, based on said gathering, when to optimize that path (col. 29, lines 31-33 'if control passes through an arc ... a number of times that is equal to a start-trace threshold, hot trace selector is invoked to select a hot trace'), in an

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analogous art for the purpose of providing dynamic optimization (col. 32, lines 26-27 'dynamically optimizes hot trace').

It would have been obvious to a person of ordinary skill in the art at the time of the invention to use Benitez's hot trace designation (col. 29, lines 31-33 'hot trace selector') to only implement the null pointer test elimination taught by Kawahito (pg. 139, col. 2, par. 6 'converted to hardware traps') when the null pointer condition was infrequent, as determined by a frequent execution of the non-null pointer trace (Benitez col. 29, lines 31-34 'if control passes through an arc of a current hot block a number of times ... select a hot trace'), because one of ordinary skill in the art would have been motivated to apply the optimizations where they would do the most good (Benitez col. 2, lines 28-31 'selecting sequences ... that are most amenable to dynamic optimization').

Regarding Claims 25-26: Schilling discloses creating a fault to target translation table (pg. 40, col. 1, par. 5 'building ... tables'), relating the fault condition to a procedural instruction in the fault to target translation table (pg. 40, col. 1, par. 5 'that relate ranges of instruction counter values to ... exception handling'); and compiling the source program to an executable program (pg. 40, col. 1, par. 5 'at compile and link time').

Schilling does not explicitly disclose the fault table handling null pointer conditions, but instead Schilling discloses handling exceptions in general (pg. 40, col. 1, par. 5 'exception handling').

Kawahito teaches eliminating explicit Null Pointer tests (pg. 139, col. 1, par. 3 'no explicit instruction has to be generated to check the null pointer') through use of

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the Null Pointer Exception (pg. 139, col. 1, par. 3 'accessing the zero address will throw an exception') in an analogous art for the purpose of optimizing the execution of a program (pg. 139, col. 2, par. 6 'converted to hardware traps ... to minimize the execution cost').

It would have been obvious to a person of ordinary skill in the art at the time of the invention to populate the exception table disclosed in Schilling (pg. 40, col. 1, par. 5 'building ... tables') with the null pointer exceptions disclosed in Kawahito (pg. 139, col. 1, par. 3 'accessing the zero address will throw an exception'), because one of ordinary skill in the art would have been motivated to handle exceptions thrown by null pointer references (pg. 139, col. 2, par. 6 'converted to hardware traps ... to minimize the execution cost') for the purpose of providing program optimization.

Further, Schilling and Kawahito do not disclose gathering statistics regarding, and determining an acceptable rate of, occurrences of the infrequent null pointer condition. However Kawahito does disclose his techniques as being applicable to a dynamically compiled language, namely JAVA™ (pg. 139, col. 1, par. 1 'a new algorithm ... written in JAVA™').

Benitez teaches gathering statistics as to the number of times a path is executed and determining, based on said gathering, when to optimize that path (col. 29, lines 31-33 'if control passes through an arc ... a number of times that is equal to a start-trace threshold, hot trace selector is invoked to select a hot trace'), in an analogous art for the purpose of providing dynamic optimization (col. 32, lines 26-27 'dynamically optimizes hot trace').

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It would have been obvious to a person of ordinary skill in the art at the time of the invention to use Benitez's hot trace designation (col. 29, lines 31-33 'hot trace selector') to determine when to implement the null pointer test elimination taught by Kawahito (pg. 139, col. 2, par. 6 'converted to hardware traps') because one of ordinary skill in the art would have been motivated to apply the optimizations where they would do the most good (Benitez col. 2, lines 28-31 'selecting sequences ... that are most amenable to dynamic optimization').

Regarding Claims 4, 12, 20 and 27-28: As indicated in the 112 2nd rejection above, these claims are not being address with prior art. But will be included here in order to maintain the dependency chain. Claims 4, 12, 20 and 27-28 are dependent on claims 2, 10, 18 and 25-26, respectively.

Regarding Claims 6, 8, 14, 16, 22, 24 and 29-32: The rejection of claims 2, 4, 10, 12, 18, 20 and 25-28 are incorporated respectively; further Schilling discloses accessing the fault to target translation table (pg. 40, col. 1, par. 5 'building ... tables') during compiling of the source program (pg. 40, col. 1, par. 5 'at compile and link time').

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 6,363,522 B1 to Click et al.; US 6,487,716 B1 to Choi et al.; US 6,735,760 B1 to Dice; US 6,343,375 B1 to Gupta et al.; "A Study of Exception Handling and Its Dynamic Optimization in Java" by Ogasawara et al.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason Mitchell whose telephone number is 571-272-3728. The examiner can normally be reached on Monday through Thursday and every other Friday from 7:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kakali Chaki can be reached on 571-272-3719. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jason Mitchell
11/12/04

 
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